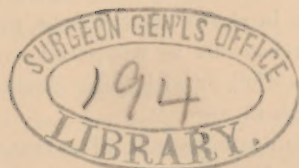


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ON THE POSITION OF THE GAMOPETALÆ. By LESTER F. WARD, of
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[ABSTRACT.]

In 1789, Laurent de Jussieu, in his "Genera Plantarum," established the three "Divisions" of Dicotyledons, assigning the Apetalous Division the lowest place, the Monopetalous Division the second, or intermediate, place, and the Polypetalous Division the highest place in the series.

In 1848, Adrien de Jussieu, in his "Cours Élémentaire de

Botanique," reversed the order of the second and third of these Divisions and gave his reasons therefor.

Notwithstanding this, nearly all subsequent authors have steadily adhered to the order established by Laurent de Jussieu, which is supposed to have been that of his uncle Bernard, the real founder of the "natural system."

This arrangement has, however, been severely criticised by Al. Braun and many others.

The present paper is designed to supplement an article "On the Natural Succession of the Dicotyledons" communicated by the writer to the "American Naturalist" for November, 1878, and to bring forward some evidence from statistics and from palæontology, as that did from organogeny, of the comparative *recency* of those plants having tubular, bell-shaped, or otherwise consolidated corollas, and thus to claim for that Division of the Dicotyledons — the *Monopetalæ*, or *Gamopetalæ*, as they are now more properly called — the highest place in the series, as did the younger Jussieu.

This is shown, first, by the great extent to which these plants are herbaceous as compared with those having the petals free (*Polypetalæ*) or with those destitute of petals (*Apetalæ*, or *Monoehlamydeæ*).

From a comparison of seventeen floras, including those of the Eastern United States, of California, of Great Britain, of Italy, of the West Indies, etc., it is found that of the total Dicotyledons the Apetalous Division furnishes on an average 13.3 per cent, the Polypetalous Division 43.3 per cent, and the Gamopetalous Division 43.4 per cent; but when the shrubs, trees, and woody vines of each of these Divisions are alone considered, we find that the *Apetalæ* furnish about 24 per cent, the *Polypetalæ* over 43 per cent, and the *Gamopetalæ* only about 33 per cent. In some of the floras compared the percentage of this last Division is as low as 20.

A perhaps still more striking way of showing this is to see what proportion the *woody plants* of each Division bear to the total number in that Division; *e. g.*, of the *Apetalæ*, which in the flora of the Eastern United States form only 13 per cent of the total Dicotyledons, 42 per cent are woody, while of the *Gamopetalæ*, which form 47 per cent of the Dicotyledons, only 16 per cent are woody.

If trees only are taken into the account the contrast becomes

still stronger. In the last named flora, which is the largest of those compared, the *Apetalæ* constitute 38, the *Polypetalæ* 45, and the *Gamopetalæ* 17 per cent of the dicotyledonous trees.

These facts seem to show that the *Gamopetalæ* constitute a comparatively late type of vegetable growth which has not yet had time, as it were, to perfect itself and assume the frutescent and arborescent forms which mark the highest development, or phytological maturity.

In the second place, and in order to anticipate the possible objection that this might equally prove degeneracy, such as is seen in the Monocotyledons and in the Cryptogams, which, though known to be older types of vegetation, are, nevertheless, at the present time chiefly herbaceous, although once probably for the most part arborescent, the following palæontological evidence was adduced:

It was shown

1. That the first appearance of plants that are clearly referable to Gamopetalous genera is much later than that of either Apetalous or Polypetalous plants.

2. That the most abundant of those genera are such as in the living flora have very deeply lobed corollas, as in *Viburnum*, thus approaching the dialypetalous condition and strongly suggesting that at the time of their appearance they might not have been truly gamopetalous at all.

3. That the relative paucity of gamopetalous species is much more marked in fossil than in living floras.

4. That the lower the horizon, the greater the disproportion in this respect.

5. That in all collections the number of *specimens* of fossil is less than of living *Gamopetalæ* in proportion to the number of species; *i. e.*, there were then not only less numerous forms, but those that existed were less abundant.

These several propositions were supported by copious citations and by tubular exhibits compiled from Schimper's "Paléontologie Végétale," Heer's "Flora tertiaria Helvetiæ," Lesquereux's Cretaceous and Tertiary Floras of the United States, and other works, as well as by data obtained from the collections of fossil plants at the United States National Museum.

